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Tellus Institute for a Great Transition

RESILIENCE THROUGH RISK PREVENTION & MANAGEMENT & ENVIRONMENTAL SUSTAINABILITY

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EXECUTIVE SUMMARY

This Issue Paper is one of six developed by the Communitas Coalition for Sustainable Cities and Regions in the New UN Development Agenda to address key themes concerning the critical role of city and regions[1] in advancing sustainable development. In the Communitas Coalition, subnational and local practitioners are core partners and a multi-stakeholder Advisory Committee ensures that our efforts reflect real-world experience. Each paper identifies a set of potential targets for consideration within an urban Sustainable Development Goal (SDG) and provides a brief discussion of the rationale for the targets and links with other potential SDGs.

The following **key messages** are outlined in the paper:

- As dense population centers often located in environmentally fragile areas, and as hubs of infrastructure and economic activity, cities are particularly vulnerable to shocks such as extreme weather, earthquakes, and resource shortages.
- Poverty and inequality greatly amplify risk so the urban poor and marginalized are especially vulnerable to natural hazards, climate change, food insecurity, and economic downturn.
- Resilience is the ability to absorb, or quickly bounce back from, an external shock.
- Resilient communities are characterized by redundancy for vital systems, flexibility, systems to contain the rippling effects of failures, rapid rebound capacity, and constant learning with robust feedback loops.
- Enhancing community resilience involves assessing existing environmental, economic, and social conditions; identifying the populations and assets most at risk; developing robust adaptation strategies and disaster response plans; and mobilizing the necessary financial and other resources.
- Resilience needs to be recognized as a core target of an urban SDG.

[1] In this paper we use the terms "cities," "city-regions," "urban areas," and "urban regions" interchangeably to denote metropolitan areas that are centers of population and economic activity. Our use of these terms is also intended to include the important links to surrounding ecosystems and rural areas. The term "regions" or "subnational governments" when used alone reflects the intermediate level of government between the local municipal level and the national one, which can take the shape of regions, states, or provinces.

- Subnational and local authorities need to be empowered and funded to enhance the resilience of their communities.
- In addition to technical approaches, reducing vulnerability for the urban poor must address inequality and power.
- Resilience should be integrated with broader local, subnational, and national development planning, as well as international aid and relief efforts.

Based on these insights, it is clear that **building community resilience, including minimizing climate change impacts, while trying to effectively manage rapid population growth and alleviate poverty is a critical challenge to sustainable development**. This Issue Paper explores resilience through risk reduction and management and environmental sustainability. Drawing on the experience of cities and regions in both developed and developing countries, it suggests the following targets for consideration within a stand-alone urban SDG and as part of sector-based SDGs.

PROPOSED TARGETS

(1) By 2020 all cities and regions have adopted policies aimed at limiting urban sprawl by reducing the rate of land conversion to less than the rate of growth of their urban population.

(2) By 2030 at least 50% of cities and regions in both developed and developing countries have identified, inventoried and completed condition assessments of major ecosystems within their region.

(3) By 2030 all cities and regions have undertaken local vulnerability assessments of current and future climate and other disaster risks to determine exposure, sensitivity and adaptive capacity of human and natural systems.

(4) By 2030, at least 50% of cities and regions in both developed and developing countries have adopted adaptation or resilience strategies, informed by rigorous vulnerability assessments that prioritize vulnerable populations and address major ecosystem integrity.

(5) By 2030 all subnational and local authorities have developed and broadly disseminated disaster response plans, including early warning systems and communications protocols, aimed at minimizing human suffering and rapidly restoring lifeline services.

(6) By 2030, all cities and regions have incorporated climate and disaster risk considerations in their zoning, building codes, and infrastructure investment decisions.

(7) By 2030, at least 50% of city and regions in both developed and developing countries have established institutional mechanisms to direct investment towards those populations and "lifeline" assets determined to be most at risk.[2]

(8) By 2030, all cities and regions have established systems that track and report their average per capita ecological footprint.

(9) By 2030 all cities and regions have a tree canopy covering at least 20% of their land area and meet the World Health Organization's suggested minimum of 9 square meters of open space per resident.

[2] Lifeline assets include those vital to the safety and health of residents including hospitals and health centers, public transportation, water and sanitation services, energy systems, and food distribution networks.

OVERVIEW

"Cities are where the battle for sustainable development will be won or lost."

Report of the UN High-Level Panel of Eminent Persons on the Post-2015 Development Agenda

There is now strong scientific evidence that we have entered a new geological epoch, the Anthropocene, where human activity is a driving force of change at the planetary scale.[3] From higher temperatures to shifting rainfall patterns and loss of biodiversity, these changes can limit the prospects for long-term sustainable development. Moreover, with population increases over recent decades and rampant growth in the exploitation of natural resources and the generation of pollutants and waste, resource depletion is now a very real concern, as is the diminishing capacity of global ecosystems to absorb the byproducts of human activity. The result is an unprecedented level of vulnerability and fragility for these ecosystems and a large segment of humanity.

As home to a growing majority of the earth's population and the dominant location for economic activity throughout the world, cities face a complex set of interrelated challenges in order to reduce environmental degradation while eradicating poverty and enhancing well-being. **These challenges must be addressed in an integrated fashion, involving all levels of government and a broad range of stakeholders, if the potential benefits of sustainable urbanization are to be realized and contribute to global sustainable development**.

[3] Crutzen, P.J. "Geology of mankind." Nature, 415(6867), 23-23, 2002, as cited in Rockstrom, Johan and Jeffrey D. Sachs, "Sustainable Development and Planetary Boundaries," Background paper for the High-Level Panel of Eminent Persons on the Post-2015 Development Agenda. May 2013.

Cities and regions[4] are also where most technological, policy, and governance innovation occurs to address sustainability issues, thereby providing the basis for national- and international-scale adoption of best practices. Most importantly, cities and regions will ultimately be the implementers of the Sustainable Development Goals (SDGs) as the various international and national targets and indicators are translated into actionable policies and programs, adapted to the specific needs of a given community.

At the same time, the growing concentration of population, capital investment, infrastructure, and economic activity in cities, combined with the fact that many of the world's large metropolitan areas are located in coastal or other sensitive zones, make residents of city-regions particularly vulnerable to shocks such as extreme weather, earthquakes, and resource shortages. One sign of this increased vulnerability associated with urbanization is that since 1970 the number of people exposed to floods and tropical cyclones has doubled. And economic losses from weather and climate related disasters routinely exceed $100 billion per year and are expected to double by 2030.[5] It is therefore **essential to empower city-regions and provide them with the necessary resources to enhance their resilience** against such risks.

DEFINING RESILIENCE

A simple definition of resilience is the ability of a system (such as a city) to absorb, or quickly bounce back from, an external shock. A more detailed meaning is offered by the United Nations Plan of Action on Disaster Reduction for Resilience: "the ability of a system to reduce, prevent, anticipate, absorb and adapt, or recover from the effects of a hazardous event in a

[4] In this paper we use the terms "cities," "city-regions," "urban areas," and "urban regions" interchangeably to denote metropolitan areas that are centers of population and economic activity. Our use of these terms is also intended to include the important links to surrounding ecosystems and rural areas. The term "regions" or "subnational governments" when used alone reflects the intermediate level of government between the local municipal level and the national one, which can take the shape of regions, states, or provinces.

[5] United Nations Office for Disaster Risk Reduction, 2013. Disaster Risk reduction at COP19, Warsaw, Poland, 11 to 22 November. Briefing Note.

timely and efficient manner, including through ensuring the preservation, restoration, or improvement of its essential basic structures and functions."[6]

In the context of sustainable development, it is appropriate to advance a more ambitious, socially-focused definition. For example, Oxfam defines resilience as: "**the ability of women, men, and children to realize their rights and improve their well-being despite shocks, stresses, and uncertainty**."[7] As described below, this aspirational, dynamic understanding of the concept acknowledges that for poor and marginalized populations, bouncing back is insufficient; resilience must enhance social and environmental conditions and economic opportunities.

In considering how to operationalize resilience in the context of a city-region, it is useful to identify its key attributes. A recent report by the Rockefeller Foundation has identified five core characteristics of resilient systems:[8]

- Resilience is the ability to absorb, or quickly bounce back from, an external shock.
- Spare capacity (sometimes called redundancy), which ensures that there is a back-up or alternative available when a vital component of a system fails.
- Flexibility, the ability to change, evolve, and adapt in the face of disaster.
- Limited or "safe" failure, which prevents failures from rippling across entire systems.
- Rapid rebound, the capacity to re-establish function and avoid long-term disruptions.
- Constant learning, with robust feedback loops that sense and allow new solutions as conditions change.

[6] United Nations System Chief Executive Board for Coordination, May 2013. United Nations Plan of Action on Disaster Risk Reduction for Resilience.

[7] Oxfam, May 2013. No Accident: Resilience and the inequality of risk, Oxfam Briefing paper 172, p. 9.

[8] The Rockefeller Foundation, 2013. Rebound: Building a More Resilient World.

EXISTING CONDITIONS

HEIGHTENED RISKS FACED BY POOR AND MARGINALIZED POPULATIONS

It should be recognized that poverty and inequality increase risk to natural hazards, climate change, food insecurity (from drought, transportation disruptions, or price volatility), etc., turning such risks into avoidable human suffering. Lacking social protection schemes, insurance, or savings to help them recover from emergencies, the urban poor and marginalized - because of caste, color, class, age, ability, or gender - are more likely to suffer from shocks than anyone else. The endemic discrimination of women - in education, health care, employment, and control of property - makes them especially vulnerable. Moreover, these populations do not have political voice/power to demand response from government or businesses.

Therefore, beyond technical approaches, in order to effectively reduce vulnerability, issues of inequality and power must also be addressed; partly by poor people gaining better access to decision-making and basic services (such as health care). While there have been calls by developing countries and NGOs for redistributing risk by having rich countries pay for the consequences of the risks they create (e.g., from CO2 emissions contributing to climate change), reaching an international agreement along these lines remains elusive. Even international development aid to deal with the aftermath of extreme events is woefully inadequate and is often misdirected (e.g., to agribusiness rather than small farmers), as it frequently fails to consider the shocks and uncertainties faced by the poor.

The aim of building resilience should not merely be aimed at helping poor people cope with crises and survive from one shock to the next, but to allow them to gain access to basic services and improve their ability to make choices about how to live their lives and thrive, despite shocks and uncertainty. So while resilience is about peoples' and systems' ability to "bounce back," it should not be interpreted to mean acceptance of a return to an impoverished or marginalized state. Some critics point to the problem of highly resilient social, economic, and po-

litical systems that are also highly unjust. In these cases, resilience may be viewed as a barrier to greater equity and enhanced quality of life for the poor.

This view of community resilience calls for more than redirecting resources to the poor or marginalized; it involves education, training, and building people's capacity. Addressing the underlying inequities requires challenging the socio-economic and political institutions that ensure relative security and resilience for some, but high levels of risk and vulnerability for many others. Those that advocate such fundamental societal change see the redistribution of power and wealth as key to enhancing resilience by creating more balanced sharing of societal risk.

ROLE OF NATIONAL AND INTERNATIONAL EFFORTS IN SUPPORTING CITY-REGION RESILIENCE

National governments have an important role to play by providing resources for systems that address underlying drivers of vulnerability as well as disaster planning and response, promoting equal access to services, and sharing risk through establishment of a social (insurance) safety net. Moreover, there is a need to explicitly integrate resilience and the reduction of inequality into national development plans. Progressive tax schemes offer one key tool for both generating the required resources at the national level while at the same time reducing inequality.

At the international level, one obvious way wealthy countries need to share the cost of reducing risks to the world's poorest in relation to climate change is by drastically lowering CO2 emissions and funding adaptation efforts in developing countries. Within the climate arena, the Cancun Adaptation Framework under the UN Framework Convention on Climate Change (UNFCCC) has provided a context for parties to address adaptation issues, including the creation and implementation of national adaptation plans in developing countries supported by developed countries through finance, technology, and capacity-building. It has also brought to the forefront the issue of loss and damage in developing countries that are particularly vulner-

able to the adverse effects of climate change. Following two years of deliberations on this issue, COP19 (November 2013) established the Warsaw international mechanism for loss and damage associated with climate change impacts. This is the primary vehicle under the Convention to promote the implementation of approaches to address loss and damage in a comprehensive, integrated and coherent manner.

At the COP19 meeting in Warsaw countries decided to further advance the engagement of local governments in the global climate regime by: (1) facilitating the exchange of experiences and best practices between cities and subnational authorities in identifying and implementing opportunities to mitigate greenhouse gas emissions and adapt to the adverse impacts of climate change, and (2) convening a specific forum as part of the UN Bonn Climate Conference in June 2014. The Warsaw outcomes confirm the key role that local and subnational actors need to play in the transformation to low-emission and climate resilient development.

This build upon Cancun COP16 Decision 1/CP16 on "Outcome of the work of the Ad Hoc Working Group on long-term Cooperative Action under the Convention (AWG-LCA)." This decision recognises the crucial role of subnational and local governments in different areas of climate action. More specifically under the shared vision for a long-term cooperative action, it refers to the need for engagement with all stakeholders and particularly which local and subnational governments as 'governmental stakeholders'.

Outside of the climate realm, the UN-sponsored World Disaster Reduction Conference in 2005 resulted in the Hyogo Framework for Action (HFA), which identified the work required from all different sectors and actors to reduce losses from natural disasters by building the resilience of nations and communities. Agreed on with input from the many partners needed to reduce disaster risk - governments, international agencies, disaster experts and many others - the HFA outlines five priorities for action aimed at reducing loss of lives and social, economic, and environmental assets when hazards strike: (1) making disaster risk reduction a priority; (2) improving risk information and early warning; (3) building a culture of safety and resilience; (4) reducing the risks in key sectors; and (5) strengthening preparedness for response.

OPPORTUNITIES & CHALLENGES

The proportion of the world's population living in cities is expected to continue to grow from over 50% in 2010 to almost 70% by 2050,[9] representing an increase of over 2.5 billion people. The vast majority of this increase will take place in developing countries, most notably in rapidly growing cities of East Asia, South Asia and sub-Saharan Africa. By 2050, 80% of the world's urban population is expected to be living in cities in the Global South. This rapid urbanization presents both great opportunities as well as serious risks.

OPPORTUNITIES

It is estimated that "**more than 60 percent of the area projected to be urban in 2030 has yet to be built**."[10] The expected growth of urban population and area provides all levels of government in collaboration with all stakeholders the chance to shape where and how this process unfolds.

On the one hand, the **economies of scale afforded by the concentration** of large numbers of people within relatively small geographic areas makes it possible for efficient provision of basic services, including housing, water and sanitation, public transportation, energy delivery, waste management, etc. The density of metropolitan areas also has the **potential to minimize our per capita environmental footprint** and allow us to live within planetary boundaries by reducing pressure on land and other natural resources, lowering CO2 and other emissions, and limiting impacts on critical ecosystems. Also, policymakers at the city-regional level are often able to act more quickly than national policymakers in implementing integrated approaches to environmental and socioeconomic challenges.

[9] UN/POP/EGM-URB/2008/01. An overview of urbanization, internal migration, population distribution and development.

[10] Secretariat of the Convention on Biological Diversity (2012). Cities and Biodiversity Outlook, SCBD, Montreal.

Moreover, as centers of economic activity and innovation, accounting for about **80% of global GDP**,[11] urban areas can provide large numbers of jobs and pathways for better livelihoods. Cities are also generally **where girls and women enjoy greater equality** (relative to rural areas) in terms of access to education, health care, and employment opportunities. In turn, the availability of such services and the generation of employment mean that urban areas have the potential to play a decisive role in reducing poverty and inequality.

CHALLENGES

At the same time, the risks posed by rapid urbanization are considerable, and are increasingly evident in many city-regions throughout the world. Though recent and projected rapid urban population growth is well documented and widely cited, the **associated land-use patterns** are not well understood. In fact, from 1990 to 2000 the geographic area of cities around the world grew more rapidly than their populations, approximately 20% faster in cities in the Global South.[12] This **urban sprawl** has a number or negative consequences and limits the extent to which the potential benefits of urbanization can be realized.

The most obvious impact is the conversion of land - from agriculture, forestry, and open space - to housing and other urban uses. Such land may be located in floodplains or other vulnerable areas, impacting the ecosystem services and biodiversity on which city-region populations depend. In addition, sprawling urban land-use patterns are associated with greater use of natural resources, longer transportation distances (e.g., for commuting), higher costs for infrastructure development, and increased socio-economic segregation.

Of course there is considerable diversity among urban areas around the world. The socio-economic and environmental challenges of cities and regions in developed countries are different from those in developing countries. Similarly, the issues faced by large mega-cities are not the same as those confronting their small- and medium-sized counterparts.

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[11] Gr¸bler, Arnulf and David Fisk, eds. (2013). Energizing Sustainable Cities: Assessing Urban Energy. Abingdon, United Kingdom: Routledge.

[12] Seta et al. (2011). A Meta Analysis of Global Urban Land Expansion, PLoS ONE.

Importantly, the per capita or per household **use of resources and production of pollution and waste vary widely across cities**. Higher income urban households, particularly in developed countries, have adopted consumption patterns that result in ecological footprints and greenhouse gas emissions (GHGs) that are multiples of those of low-income households and are far beyond the earth's bio-capacity and levels required for climate stabilization.[13] Though planetary boundaries are not evident at the city, region or even national level, such consumption patterns must systematically change in order to align with bio-physical planetary boundaries[14] and allow impoverished urban populations, especially in developing countries, to consume at levels that at least meet their basic needs.[15] Unfortunately, such resource- and carbon-intensive consumption patterns are increasingly being followed by households with rising incomes in rapidly urbanizing cities in developing countries. This represents a major challenge to sustainable urban development, one that may require not only **"leapfrogging" damaging practices through transfer of green technologies** from developed countries, but also **cultural shifts** away from emulating the destructive practices that characterize development in much of the Global North.

In cities **in developing countries the newly developed urban areas are often unplanned and result in slums** of low-income residents who lack adequate shelter and typically are not served by existing water, sanitation, energy, or transportation infrastructure. Nor are they convenient to existing schools, health facilities, or employment opportunities. UN-Habitat states that the

[13] The Department of Economic and Social Affairs of the United Nations Secretariat (2013). World Economic and Social Survey 2013: Sustainable Development Challenges, New York; and UN-Habitat, accessed on 22 November 2013 at http://www.unhabitat.org/content.asp?typeid=19&catid=10&cid=928.

[14] Rockstrom, J. et al. (2009). Planetary boundaries: exploring the safe operating space for humanity. Ecology and Society, Vol. 14, No. 2.

[15] While increasing efficiency of production and consumption practices, "decoupling" of economic growth from natural resource use (and damage), and internalizing environmental externalities in the prices of goods and services can all contribute to lessening pressure on the earth's biophysical systems, absolute reductions in global resource use and emissions are required. This implies deep cultural changes and a fundamental shift in consumption by high-income households in which prosperity and "the good life" is redefined away from material acquisition.

number of people living in slums could triple by 2050 if left unchecked.[16] Frequently lacking access to basic services and amenities, or employment opportunities, slum dwellers are often isolated physically, economically, and socially, making them particularly vulnerable to the range of risks described above. Effectively improving the living conditions of slum dwellers is therefore critical for improving social equity, enhancing resilience, and advancing sustainable development.

The risks of rapid urbanization are particularly important when we consider the resilience of urban areas in the face of climate change, natural hazards, population pressures, resource shortages, and increased demand for social services and public utilities. According to UN-DESA "[The] urgency is acute considering that **30-50% of the entire population of cities in developing countries live in** settlements that have been developed in environmentally **fragile areas**, vulnerable to flooding or other adverse climate conditions, and where the quality of housing is poor and basic services are lacking"[17] Unless addressed, these vulnerabilities will translate into further impoverishment and human suffering.

Urban areas are already heavily affected by hazards such as flooding and drought, heat waves, hurricanes/typhoons, and earthquakes. In recent years, many of the world's leading cities, including New York, Beijing, Moscow, New Delhi, Paris, and others have suffered from extraordinary environmental crises, including massive storms, flooding, heat waves, and droughts.[18] **Climate change** is expected to make extreme weather events more frequent and more severe. In addition to the **direct physical damage** to the built environment - homes, commercial and institutional buildings, as well as key infrastructure such as transportation, water and sanitation, energy, communications - climate change is also expected to have significant **impacts on**

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[16] The Department of Economic and Social Affairs of the United Nations Secretariat (2013). World Economic and Social Survey 2013: Sustainable Development Challenges, New York; and UN-Habitat, accessed on 22 November 2013 at http://www.unhabitat.org/content.asp?typeid=19&catid=10&cid=928.

[17] UN-DESA Policy Brief No. 25, The challenges of adapting to a warmer planet for urban growth and development. United Nations Department of Economic and Social Affairs. Accessed on 22 November 2013 at http://www.un.org/esa/analysis/policybriefs/policybrief25.pdf.

[18] Rockstrom, Johan and Jeffrey D, Sachs, Sustainable Development and Planetary Boundaries, Background paper for the High-Level Panel of Eminent Person on the Post-2015 Development Agenda.

the ecosystems that provide metropolitan areas with essential services, including food. Metropolitan areas in developing countries and their low-income residents are particularly vulnerable to these changes as they often lack the institutional capacity and resources to reduce climate risk, build rapid recovery systems, or otherwise adapt.

POLICY APPROACHES

Several policy approaches have been developed at the international, national, subnational and local levels aimed at building resilience through risk reduction and management. It is important to note that improving **resilience is not a simple, unidimensional endeavor**. To be effective, policy approaches for building resilience must address the environmental (physical), economic, as well as the social aspects of the risks. The impacts of natural disasters, climate change, food insecurity, and other risks are felt most acutely by people and systems at the city-region level - where livelihoods are lost, infrastructure is destroyed, and food and water security is threatened. Thus, the local level, supported by multi-level governance cooperation and public-private partnerships, plays a critical role in bringing together key stakeholders and people to plan for and implement resilience strategies.

Policy approaches can be broadly categorized as having the following objectives:

- **Reducing environmental emissions and protecting ecosystems**
- **Enhancing the capacity of natural and man-systems**
- **Building response capabilities for effective recovery**

These policy approaches are discussed below with a particular focus on the risks associated with climate change as an example. Of course, climate change is only one of several major risks facing city-regions, albeit a very important one since it tends to amplify other risks.

REDUCING ENVIRONMENTAL EMISSIONS AND PROTECTING ECOSYSTEMS

Several of the risks that compromise the resilience of urban populations are related to environmental pollution (e.g., particulate air pollution, contamination of water supplies) and ecosystem degradation (e.g., loss of wetland and the associated the flood control capacity). The expected impacts of climate change will exacerbate these risks in a number of ways. A myriad of policy approaches are being implemented at city, regional, national and international levels

to reduce GHG emissions or expand "sinks" to remove carbon dioxide from the atmosphere. These are aimed at mitigating the potential impacts of climate change, thereby protecting human populations, the built environment, and natural ecosystems. Common mitigation policies include ones that focus on promoting energy conservation, switching to low-carbon energy sources such as renewables, increasing efficiency of transportation systems, encouraging mixed-use dense settlement patterns, improving building codes, reducing material and energy throughput in production and consumption systems, and expanding forests and other CO2 sinks.

At the international level, the Kyoto Protocol commits Parties of the UN FCCC to emission reduction targets. Under the Protocol, countries meet their targets primarily through national measures, though it offers additional means to meet their targets through various market-based mechanisms.[19] The UNFCC is currently working towards a universal agreement in 2015, which would come into force in 2020.

Parallel to the international policy efforts, many countries and cities throughout the world have adopted and begun to implement climate mitigation plans. For example, ICLEI's long-standing Cities for Climate Protection Campaign and its more recent Green Climate Cities effort assists localities in developing comprehensive climate change mitigation programs. Hundreds of cities representing hundreds of millions of people around the world, from Bangkok to Rio de Janeiro to New York, have instituted climate mitigation programs and report on their GHG emissions.

As with most policy approaches for enhancing resilience, the effective implementation of climate mitigation plans requires engagement of all stakeholders: residents, businesses, government and NGOs. In fact, public-private partnerships are playing an increasingly important role in financing and implementing mitigation efforts in a number of cities around the world. The C40 Cities Climate Leadership Group, in conjunction with the Clinton Foundation's Climate

[19] The three market-based mechanisms established under the Protocol are: international emissions trading; the Clean Development Mechanism (CDM), and joint implementation (JI). For details about the Protocol and the UNFCCC see: http://unfccc.int/2860.php.

Initiative, is a public-private partnership that includes some of the world's largest cities (58 are affiliated as of December 2013) working cooperatively to reduce greenhouse gas emissions.

There are also policy approaches for enhancing resilience directly aimed at protecting ecosystems and the services they provide to city-regions and their inhabitants. Examples of such policy mechanisms include: payment by downstream water users to upstream landowners and communities to implement land conservation and watershed protection measures to ensure clean drinking water supplies (e.g., New York City); valuating ecosystem services as a means to leverage public and private investment in ecosystem protection (e.g., Cape Town, South Africa); urban tree planting to mitigate the heat-island effect, absorb stormwater, and sequester carbon (e.g., Canberra, Australia); and in many cities providing public space for urban and peri-urban agriculture and farmers' markets, thereby preserving open space, strengthening local food systems, and decreasing dependence on long supply chains and transportation. These ecosystem protection policies also generally require multi-stakeholder engagement and multi-level governance.

ENHANCING THE CAPACITY OF NATURAL AND MAN-MADE SYSTEMS

Resilience is also about enhancing the capacity of natural and man-made systems to withstand the risks of extreme weather, earthquakes, resource shortages, and climate change. Several of the ecosystem protection approaches described above also increase the resilience of these natural systems to withstand and bounce back from such threats. At the international level, the importance of ecosystem services and the critical linkages to biodiversity are reflected in the Aichi Biodiversity Targets under the international Convention on Biological Diversity.

In addition, policies to enhance the capacity of man-made systems include integrated land use planning that considers vulnerability and identifies target areas for growth; strengthened zoning, siting and building code policies to avoid floods; upgrading infrastructure through en-

hanced maintenance and "flood-proofing;" and implementing green infrastructure to reduce stormwater runoff.

To address vulnerability from climate change, programs and policies are often organized into climate adaption plans, which have been developed at the national, sub-national, and city level. Climate adaptation plans generally include both (1) a vulnerability assessment in which baseline conditions in key sectors are assessed, climate trends and projections are reviewed, and particularly vulnerable populations identified; and (2) a set of targeted adaptation strategies that address the identified vulnerabilities with clear prioritization of populations and systems most at risk. The plans generally cover both natural ecosystems such as coastal zones, wetlands and forests, as well as human systems such as transportation and energy infrastructure, human health and welfare, and economic and governance activities.

The UNFCC national adaptation plan (NAP) process provides a framework for the development and implementation of national adaptation plans. It aims to facilitate the integration of climate change adaptation into relevant new and existing policies, programs and activities, in particular development planning processes and strategies.

At the national and subnational levels a reframing of adaptation efforts as "climate-resilient development planning" is starting to emerge.[20] UNDP, for example, has developed guidance on strategies to "simultaneously address the threats, risks, vulnerabilities and uncertainties associated with global climate change and the pressing development needs countries face as they pursue sustainable development."[21]

Cities and regional entities are also very actively engaged in adaptation planning, driven partly by the enormous human and property losses that have resulted from extreme weather events in recent years. The insurance industry is an active player in public-private partner-

[20] See for example, "Shaping Climate-Resilient Development: a framework for decision-making," A Report of the Economics of Climate Adaptation Working Group, 2009.

[21] United Nations Development Programme. Preparing Low-Emission Climate-Resilient Development Strategies: A UNDP Guidebook, 2011.

ships to advance adaptation efforts and build resilience. For example, a collaboration between ICLEI, Ceres and other NGOs, and insurance industry representatives called "Building Resilient Cities" brought together urban stakeholders in three North American cities to explore ways of reducing climate risks and improving the performance and value of climate-vulnerable local areas.[22] Given their strong economic interest, the international insurance industry is actively engaged in assessing risks and promoting policies and practices that enhance urban resilience and minimize losses from extreme weather events.[23]

BUILDING RESPONSE CAPABILITIES FOR EFFECTIVE RECOVERY

Even with considerable progress in terms of mitigation and adaptation, cities and regions throughout the world will still be vulnerable to extreme weather events, earthquakes, resource shortages, and some level of climate change impacts. Coastal areas, home to a high fraction of the world's large cities, are especially vulnerable, given projections concerning sea-level rise and increased storm intensity. As discussed, the urban poor in developing countries are particularly at risk owing to substandard housing, poor mobility, and lack of resources (i.e. insurance or savings) to relocate or recover. Moreover, it is important to recognize that disasters can devastate both the built environment and the social capacity to respond, resulting in longer term impacts and barriers to development.

A major policy to enhance resilience is the development and effective implementation of emergency/disaster response plans. Though effective disaster response activity requires close coordination among various levels of governance, lack of strong governance is often a major obstacle. City and regional government agencies and other stakeholders at the metropolitan level play a particularly critical role as they are the primary first responders. Moreover, these entities have a detailed understanding of local infrastructure and services, as well as where the most vulnerable populations are located. Of course national governments, international aid

[22] See for example "Building Climate Resilience in Cities: Priorities for Collaborative Action," Ceres, et al., 2013, accessed at http://www.ceres.org/industry-initiatives/insurance/building-climate-resilient-cities.

[23] See for example, Swiss Re, Mind the risk: A global ranking of cities under threat from natural disasters, Zurich, 2013.

organizations and the NGO community also have an important role in strengthening response capabilities through funding and logistical support.

The Durban Adaptation Charter for Local Governments,[24] launched in Durban, South Africa in 2011, acknowledges that the cities of the global south will suffer disproportionate impacts from extreme weather events and other shocks, but have limited resources and infrastructure to adequately protect themselves and insufficient means to recover. The Charter commits local governments to assist their communities to respond to and cope with the risks from climate change. The Durban Adaptation Charter also recognizes the need to integrate climate adaptation planning with broader urban development strategies.

According to the Active Learning Network for Accountability and Performance in Humanitarian Action (ALNAP), a broad coalition focused on improving post-disaster humanitarian action, disaster recovery and reconstruction provide an opportunity to redress many of the risks faced by the urban poor, but only if prevention is made an explicit priority.[25] Moreover, failure to incorporate risk reduction into all aspects of disaster response activities increases the likely impact of future disasters. ALNAP suggests that disaster response efforts should reduce future vulnerability by improving both the urban built environment and the resilience of urban social and governance systems. This is consistent with UN-Habitat's approach of "building back better" as a way of reducing risks and connecting relief and recovery to long-term development.

Lessons from past disaster response and recovery efforts point to several key policy lessons including:[26]

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[24] See http://www.durbanadaptationcharter.org/.

[25] Established in 1997 following the Rwanda genocide, ALNAP has over 80 members including several UN agencies, donor organizations, the Red Cross/Crescent movement, non-governmental organizations and networks, plus research organizations, academics and independent experts. See "Responding to urban disasters: Learning from previous relief and recovery operations," ALNAP and Provention Consortium, 2009, with updated version as ALNAP Lessons Paper, November 2012.

[26] Responding to urban disasters: Learning from previous relief and recovery operations," ALNAP and Provention Consortium, 2009, with updated version as ALNAP Lessons Paper, November 2012.

- **Build on local capacity**: Participatory approaches to recovery should draw on the knowledge and experience of local civil society organizations to design and implement disaster-response programs.
- **Leverage local markets**: Relying on local/regional markets, where possible, to provide and/or distribute relief supplies and services can reduce costs, streamline logistics, and support local livelihoods. Moreover, it builds greater community ownership of disaster relief and recovery activity and is critical for rebuilding local livelihoods.
- **Link reconstruction with infrastructure planning**: Rather than simply rebuilding housing, reconstruction should include provision of basic services including energy, water and sanitation, and a strengthened health services infrastructure.
- **Relocation should be a last resort**: While relocating communities away from high-risk areas may reduce vulnerability, impacted residents often value the proximity to urban centers, affordability, and social networks despite the increased risk of living in hazard-prone areas. As such, relocation efforts often fail as those affected prefer to stay near their own destroyed homes rather than in new, distant locations.[27]

In addition, in 2010 the UN Office for Disaster Risk Reduction (UNISDR) launched the "Making Cities Resilient" Campaign, to enhance understanding of disaster risk and promote resilience activities in sustainable urban development. The Campaign encourages commitments from local and national governments to make disaster risk reduction and climate adaptation a policy priority. As of April 2013 more than 1,400 cities had joined the Campaign with 40 Role Model Cities agreeing to coach others.[28]

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[27] Nonetheless, ALNAP and UNDP recognize that large-scale resettlement may be unavoidable in the future given projections of likely increased flooding in urban areas due to sea-level rise. One critical aspect of relocation, when necessary, is providing compensation for the land and housing that is lost.

[28] See www.unisdr.org/campaign/resilientcities.

PRACTITIONER EXPERIENCE

Many cities and regions in both developed and developing countries now recognize their vulnerability to climate change, natural hazards, increased pressure on resources and services, and other threats. Only a small fraction, however, has taken active steps to plan and implement policies and programs to build resilience. Cities and regions in the Global North, which are not confronted with the rapid population growth and urbanization challenges facing those in developing countries, have generally had greater capacity and resources to address the resilience issue.

Some cities have developed detailed vulnerability assessments and adaptation plans, and in some cases these include rough costs estimates for major infrastructure investments and implementation schedules. For instance, recent experience with adaptation planning in Rotterdam, London, and New York, provide positive examples of integrated approaches. An excellent model of integrating resilience considerations into broader city planning is New York City's PlanNYC. The effort involves some 25 agencies and reflects an integrated strategic plan to address several long-term challenges - incorporating an additional one million residents, strengthening the economy, combatting climate change, and enhancing the quality of life for inhabitants.

In the global south, the State of Paraná, Brazil has focused on preserving ecosystems as a means of mitigating and adapting to potential environmental impacts. It is building resilience through biodiversity restoration and ecosystem protection (see box).

STATE OF PARANÁ, BRAZIL

The Department of Environment and Water Resources in the State of Paraná, Brazil has established the "Bioclima Program" to focus on conserving and restoring the biodiversity of the region through enhancement of natural areas, forests and other habitats. The Bioclima Program is aimed at the mitigation and adaptation of climate change, and the overall improvement in the quality of life of Paraná residents.

The Program's Biodiversity Restoration Project (REBIO) is restoring riparian and fragile areas, establishing ecological corridors, controlling invasive species, and participating in broader urban planning activities to advance integrated sustainability strategies.

As part of this restoration effort, it has established 20 nurseries that produce native tree species for planting in the riparian areas that form the ecological corridors. Working closely with municipalities in the region, Bioclima's reforestation effort in urban and rural areas planted over 15 million seedlings since 2011.

The Program is assessing the risks and vulnerabilities to climate change, mapping areas of environmental vulnerability, and working on adaptation strategies. They have also engaged in a range of environmental monitoring efforts, including use of satellite imagery (to track land use changes) and air quality monitoring.

In 2012 the Bioclima Paraná initiated the Payment for Environmental Services (PES) program to pay property owners, including farmers, for preserving biodiversity and natural areas, maintaining the quality of water resources, or sequestering carbon.

As key to its success, the Bioclima Program points to the establishment of a partnership network that includes NGOs, private land owners, industry and agriculture business associations, and local government agencies from the 169 municipalities in Paraná. Though it has had significant success, the major challenge is insufficient institutional capacity, especially technical staff, to meet the growing demand for projects and activities. Additional financial resources would also allow it to enhance its conservation incentive program.

PROPOSED TARGETS FOR AN URBAN SDG

Before identifying potential targets related to resilience through risk prevention and management and environmental sustainability for an urban SDG, it is useful to acknowledge that these targets are not proposed in a vacuum. Rather, they are informed by and **build upon a number of relevant targets** in the existing Millennium Development Goals (MDGs) as well as the proposals from various stakeholders interested in urban targets for the SDGs. While some of these targets are not explicitly focused on resilience, they are directly related to it.

For example, Goal 7 of the **MDGs** is "Ensure environmental sustainability," and proposed targets include: (A) ... reverse the loss of environmental resources; (B) Reduce biodiversity loss, achieving, by 2010, a significant reduction in the rate of loss; (C) Halve by 2015, the proportion of the population without sustainable access to safe drinking water and basic sanitation; (D) By 2020, to have achieved a significant improvement in the lives of at least 100 million slum dwellers.

For the SDGs, **UN-Habitat** has articulated three possible goals including "**Achieve safe, inclusive, productive and resilient cities and human settlements**."[29] Among the twelve sustainable cities targets identified by UN-Habitat, those most relevant to building city-region resilience include:

By 2030,

- Halve the acceleration of sprawl (urban land cover) relative to population increase.
- Halve the proportion of people living in slums in each country towards inclusive and adequate housing.
- All utilities and municipal governments provide sustainable and safe water and sanitation services to all in their jurisdiction.

[29] UN-Habitat (2013). Revised Compilation for Sustainable Cities & Human Settlements in the Sustainable Development Goals (SDGs) within the Post-2015 Development Agenda, 20 December 2013. The other two possible goals identified by UN-Habitat are: "Achieve sustainable cities and human settlements" and "Achieve well-planned cities and human settlements."

- Increase to 20% the number of cities adopting and implementing policies and plans that integrate comprehensive measures to strengthen resilience.
- Double the share of renewable energy in urban areas to 30% of global energy; double energy efficiency in all buildings and transport; and achieve universal access to improved energy in urban areas.

The urban goal proposed by the **UN Sustainable Development Solutions Network** (UN SDSN) is "**Empower inclusive, productive, and resilient cities**." Its targets include: (3) ensure safe air quality and water quality for all, and integrate reductions in greenhouse gas emissions, efficient land and resource use, and climate and disaster resilience into investments and standards.[30]

Other entities that have proposed goals and targets relevant to urban resilience include the Asia-Europe Environmental Forum (ENVforum), the Global Task Force of Local and Regional Governments for Post-2015 and Habitat III, and ICLEI's Mayors Adaptation Forum and Bonn Declaration of Mayors.

[30] Sustainable Development Solutions Network, 2013. Sustainable Development Goals (SDGs) and Targets proposed by the SDSN.

COMMUNITAS PROPOSED TARGETS

Noting the targets described above and informed by the findings of this Issue Paper, including input from local and regional practitioners and the project Advisory Committee, the Communitas Coalition proposes the following targets related to enhancing resilience through risk reduction and management and environmental sustainability. Note that while targets relate to cities and regions directly, meeting such targets should build on national-level programs where they exist.

(1) By 2020 all cities and regions have adopted policies aimed at limiting urban sprawl by reducing the rate of land conversion to less than the rate of growth of their urban population.

(2) By 2030 at least 50% of cities and regions in both developed and developing countries have identified, inventoried and completed condition assessments of major ecosystems within their region.

(3) By 2030 all cities and regions have undertaken local vulnerability assessments of current and future climate and other disaster risks to determine exposure, sensitivity and adaptive capacity of human and natural systems.

(4) By 2030, at least 50% of cities and regions in both developed and developing countries have adopted adaptation or resilience strategies, informed by rigorous vulnerability assessments that prioritize vulnerable populations and address major ecosystem integrity.

(5) By 2030 all subnational and local authorities have developed and broadly disseminated disaster response plans, including early warning systems and communications protocols, aimed at minimizing human suffering and rapidly restoring lifeline services.

(6) By 2030, all cities and regions have incorporated climate and disaster risk considerations in their zoning, building codes, and infrastructure investment decisions.

(7) By 2030, at least 50% of city and regions in both developed and developing countries have established institutional mechanisms to direct investment towards those populations and "lifeline" assets determined to be most at risk.[31]

(8) By 2030, all cities and regions have established systems that track and report their average per capita ecological footprint.

(9) By 2030 all cities and regions have a tree canopy covering at least 20% of their land area and meet the World Health Organization's suggested minimum of 9 square meters of open space per resident.

Along with the potential complimentary targets identified in other Communitas Issue Papers, these targets provide a framework for operationalizing an urban SDG. Once a unified set of urban SDG targets has been prioritized, indicators and metrics for each target will be identified. The Communitas Coalition will consult with national, regional and local authorities as well as civil society organizations to identify an approach for universal benchmarking that accommodates differential interpretations of targets along regional and/or national lines.[32]

[31] Lifeline assets include those vital to the safety and health of residents including hospitals and health centers, public transportation, water and sanitation services, energy systems, and food distribution networks.

[32] This is the approach articulated by UN-Habitat in its Proposed Sustainable Development Goal, Sustainable Cities & Human Settlements, 21 December 2012.

LINKS TO OTHER POSSIBLE SDGS

In addition to the specific targets identified above and in the other Communitas Issue Papers, a number of other stakeholders have proposed sector-based SDG themes that have a strong urban/territorial dimension. Highlighted below are several proposed sector-based themes and a brief description of their connection with resilience of city-regions.

Poverty and inequality - The environmental, economic, and social conditions in which urban slum dwellers live make them among the most vulnerable populations to shocks such as extreme weather events, earthquakes, and resource shortages. Whereas wealthy people risk losing assets to such shocks, poor slum dwellers are more likely to risk their lives and livelihoods.

Health - Without access to adequate shelter, water and sanitation services, or healthcare, slum dwellers and other low-income urban residents generally have higher incidences of respiratory, intestinal, and a range of other diseases. This compromised health status is a major contributing factor to their vulnerability to climate change and other risks.

Sustainable human development within planetary boundaries - Rapid urbanization has resulted in land conversion rates that often exceed the rate of urban population growth. Such conversions often result in the loss of forests, agricultural land, or open space that provide critical ecosystem services, resulting in reduced buffering capacity and less resilience.

Sustainable production and consumption - Consumption patterns of high-income households, particularly in cities in developed countries, cause pressure on forests, food systems, and a range of natural resources. This contributes to climate change and its related impacts, and also results in degraded ecosystems, compromising the resilience of city-regions throughout the world.

Energy and climate change - With cities accounting for 70-80% of energy use, greenhouse gas emissions and GDP, cities and regions have a critical role to play in a transformation to a low-

carbon, renewable energy economy. Climate change driven by fossil fuel use is perhaps the single most important risk driving the need for enhanced resilience of city-regions.

Biodiversity and ecosystems - The loss of biodiversity and ecosystem services is often closely associated with rapid urbanization and land conversion. Compromised forest, marine and other ecosystems are less able to provide buffering capacity against climate change and natural hazards. Protecting critical ecosystems in rapidly urbanizing areas is a key strategy for building resilience.

Agriculture and food security - Cities and the wider region in which they are located are largely dependent on and closely linked to surrounding rural areas for food. As agricultural land is converted for urban uses or yields are reduced due to extreme weather events or water shortages related to urban demands, food security is threatened, thereby harming a region's overall resilience.

MOVING FORWARD

In order to achieve the potential environmental, economic, and social benefits of sustainable urbanization, this paper supports the adoption of an urban SDG that incorporates resilience targets. The growing concentration of population, capital investment, infrastructure, and economic activity in cities, combined with the fact that many of the world's large metropolitan areas are located in coastal or other sensitive zones, make city-regions particularly vulnerable to shocks such as extreme weather, earthquakes, and resource shortages. It is therefore essential to empower cities and regions and provide them with the necessary resources to enhance their resilience against such risks.

The proposed targets are aimed at enhancing community resilience and providing a framework within which progress can be tracked over the coming decades. Once there is a consensus within the UN intergovernmental Open Working Group on SDGs on a set of urban targets, the next steps will be to identify which targets fall within a stand-alone urban SDG and which should be linked with other sector-based SDGs, and then to develop and propose specific indicators to measure progress towards these targets, identifying potential data sources and methods for consistent measurement across cities and countries.